NASA Specialized Center of Research and Training (NSCORT) Exobiology

A SPACE PROBE INTO THE CHEMISTRY OF LIFE

PAYLOAD G-768

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MOTIVATION

- Amino acids: building blocks of life
- Produced by electric spark discharges on Earth (1953)
- Extraterrestrial amino acids discovered in meteorites (1970)
- Test amino acid synthesis in space

LIP EXPERIMENT

- **Fill flask**
  - » methane, nitrogen, aqueous ammonium chloride
- **Expose flask to laser**
  - » Nd:YAG (200 mJ, 10 Hz)
  - » 5 to 20 minutes
- **Amino acid analysis**
  - » HPLC

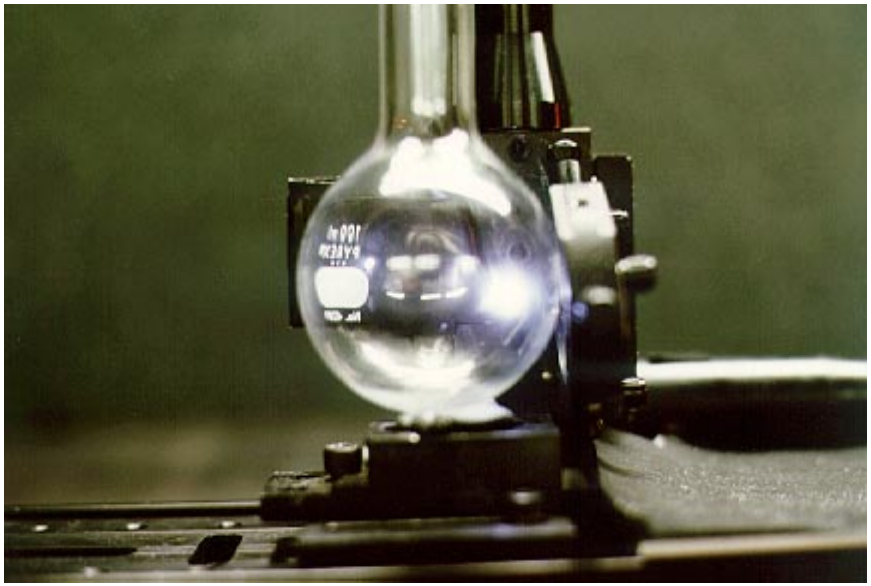
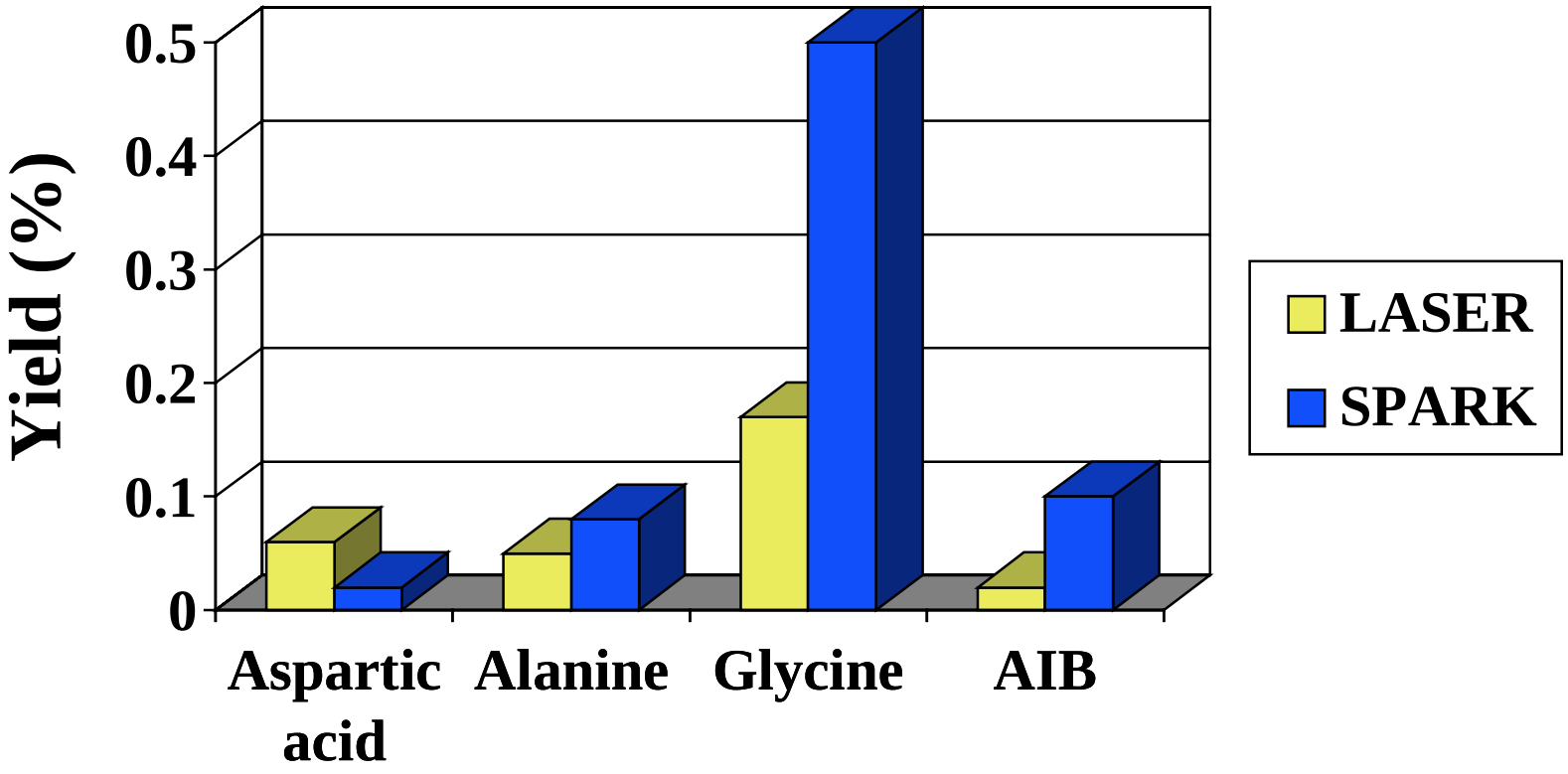


Photo courtesy of Alien Technology, Inc.

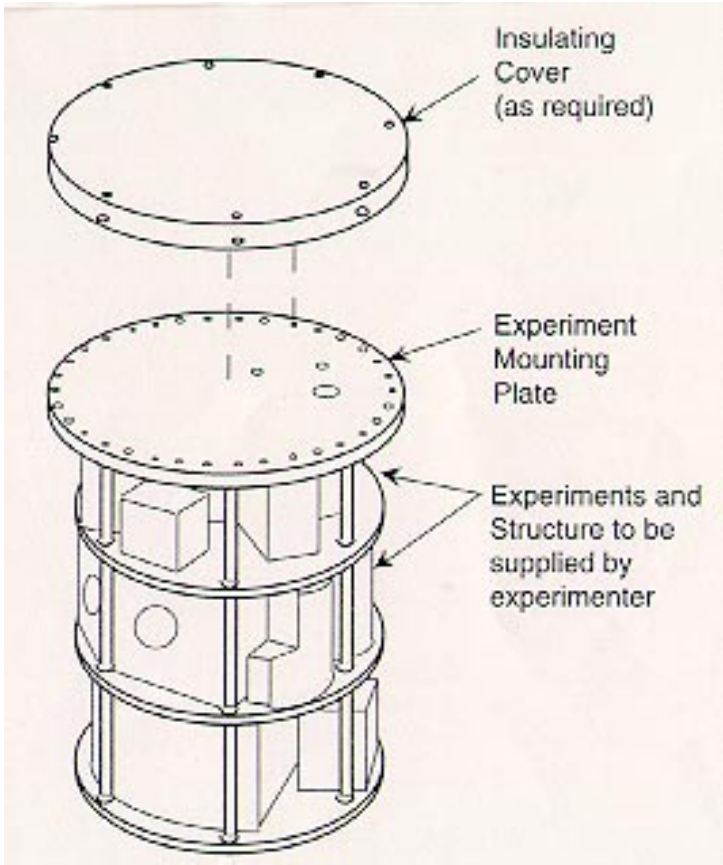

Yield (%)
0.5
0.4
0.3
0.2
0.1
0
Aspartic acid
Alanine
Glycine
AIB
LASER
SPARK

WHY TEST IN SPACE?

- Amino acid synthesis has never been demonstrated in space
- Test effects of microgravity
- Model interstellar region chemistry

PAYLOAD STRUCTURE

- **3rd deck**
  - » flasks (20)
  - » optical actuator
- **2nd deck**
  - » laser system
  - » controls
- **1st deck**
  - » payload batteries



GAS container (5 ft^3 vol.)

CONCLUSIONS

- Amino acids can be synthesized using LIP.
- LIP good alternative to spark discharge.
- Rapid production: LIP ideal for testing in space.